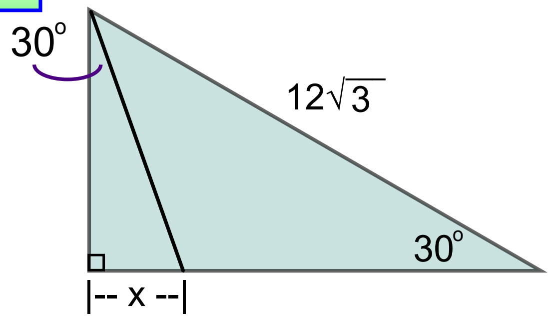
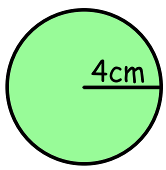
Precalc Warm Up # 5-2

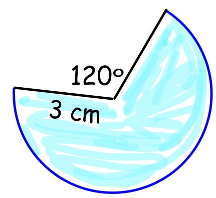
1. Solve for x exactly.



2. Find the exact circumference and area of the circle



3. Find the exact circumference and area of the sector.



$\boxed{2^{nd}}$ Angle $\boxed{\text{APPS}}$ for ° & '

1. Convert $\boxed{25^\circ 48' 10''}$ to decimal degrees $\approx 25.803^\circ$

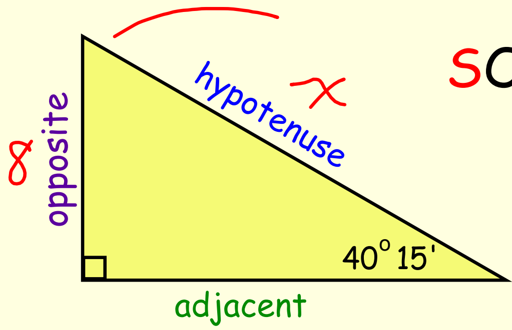
$\boxed{\text{ALPHA}}$ $\boxed{+}$ "

2. Convert 48.718° to degrees, minutes, and seconds

$48^\circ\, 43'\, 4.8''$

DMS in the angle menu: $\boxed{2^{nd}}$ Angle $\boxed{\text{APPS}}$

If the opposite side of the 40°15' angle is 8cm, how long (to 3 s.f.) are the other two sides?



y

SOH CAH TOA

$\sin(40°15') = \frac{8}{x}$

$x = \frac{8}{\sin(40°15')}$

$x \approx 12.4$

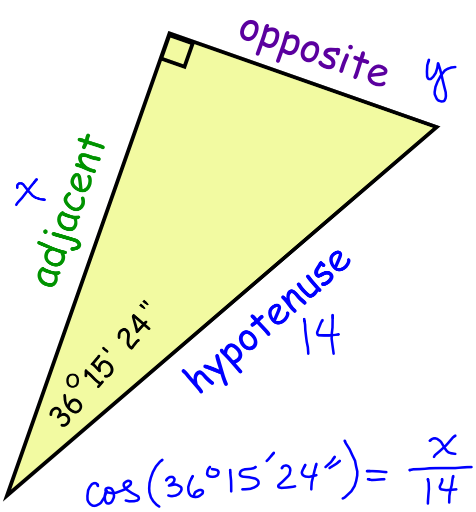
Angle Menu on Calculator

$\boxed{2^{nd}}$ Angle $\boxed{APPS}$

$\tan(40°15') = \frac{8}{y}$

$y = \frac{8}{\tan(40°15')}$

$y \approx 9.45$



Hypotenuse = 14 ft,
find the other 2 sides

$\cos(36°15'24'') = \frac{x}{14}$

$x = 14\cos(36°15'24'')$

$x \approx$

$\sin(36°15'24'') = \frac{y}{14}$

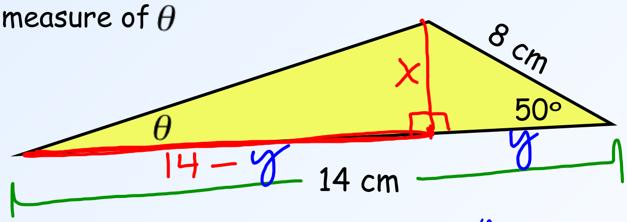
$y = 14\sin(36°15'24'')$

$y \approx$

$x \approx 11.3 \quad y \approx 8.28$

The Sine, Cosine, and Tangent give the side ratios for right triangles only! If it isn't right, try to break it up into right triangles.

Ex: Find the measure of θ



$\sin 50° = \frac{x}{8}$

$x = 8 \sin 50°$

$\cos 50° = \frac{y}{8}$

$y = 8 \cos 50°$

$$\tan\theta = \frac{8\sin 50°}{14 - 8\cos 50°}$$

$$\theta = \tan^{-1}\left(\frac{8\sin 50°}{14 - 8\cos 50°}\right)$$

in angle menu

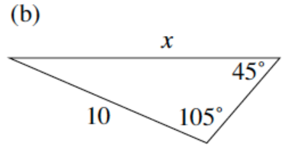
$\theta \approx 34.68° \longrightarrow$ DMS

$\theta \approx 34° 40' 41.2''$

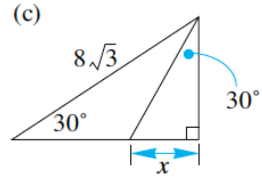
HW Questions: p. 277

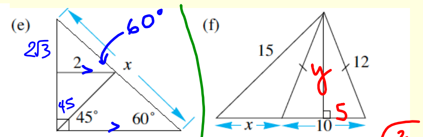
2. Find the exact value of x in each of the following

(b)



(c)

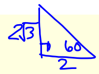


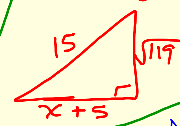


find $y \rightarrow \sqrt{y^2} = \sqrt{12^2 - 5^2}$

$y = \sqrt{119}$

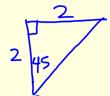
Sm Δ:



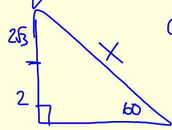


Now pythagorean Theorem

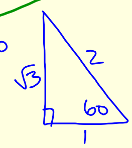
mid Δ:



lg Δ:



compare to



$$\frac{x}{2} = \frac{2+2\sqrt{3}}{\sqrt{3}}$$

$$x = \frac{4+4\sqrt{3}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$= \frac{4\sqrt{3}+12}{3}$$

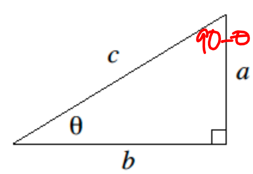
$$\frac{4\sqrt{3}}{3} + 4$$

3. Using the triangle on the right, show that

(a) $\sin(90° - \theta) = \cos\theta$

(b) $\cos(90° - \theta) = \sin\theta$

(c) $\tan(90° - \theta) = \dfrac{1}{\tan\theta}$



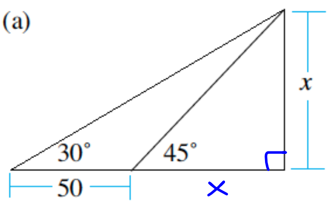
$$\frac{b}{a} = \frac{1}{\frac{a}{b}}$$

$$\frac{b}{a} = \frac{b}{a} \checkmark$$

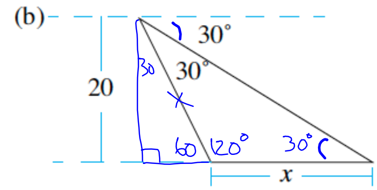
a) $\dfrac{b}{c} = \dfrac{b}{c}$

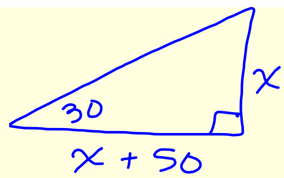
4. Find the exact value of x in each of the following.

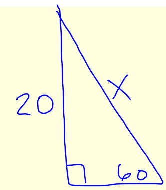
(a)



(b)







Two ways to measure angles:

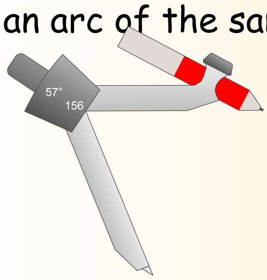
Degrees (either decimal or deg° min'sec")

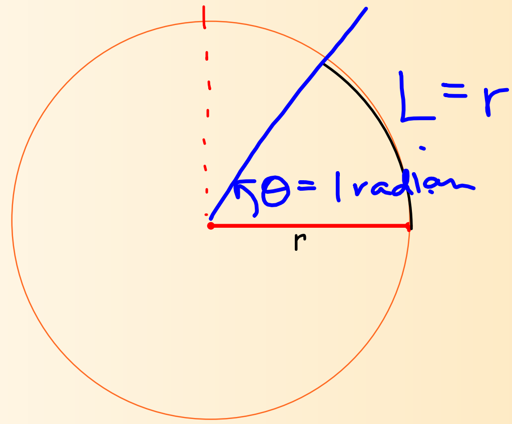
Based on the convention that there are 360° in one complete revolution. Why 360?

Radians

Radian measure is not arbitrary. It is a natural measurement system based on the relationship between a radius and arc of a circle.

1 radian is the measure of an angle needed to subtend (cut off) an arc of the same length as the radius.





$\approx 50^\circ$ $\quad \approx 60^\circ$ $\quad$?

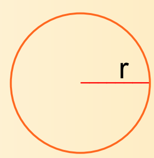
One radian looks like it equals about how many degrees?

To find Θ in radians for a full circle: $\quad \Theta = \frac{\text{Arc Length}}{\text{Radius}}$

A complete circle has an arc length of $2\pi r$ $\rightarrow$ $\Theta = \frac{2\pi \cancel{r}}{\cancel{r}}$

$360^\circ = 2\pi$ radians

$180^\circ = 1\pi$ radian



We use this fact to convert between radians and degrees.

$$\frac{1\ \cancel{\text{radian}}}{1} \cdot \left(\frac{180 \text{ degrees}}{\pi\ \cancel{\text{radians}}}\right) \approx 57.296 \text{ degrees}$$

1

Convert the following:

1. $\frac{45\cancel{^\circ}}{1} \cdot \frac{\pi \text{ rad.}}{180\cancel{^\circ}}$ $\quad$ 2. $\frac{3\ \cancel{\text{radians}}}{1} \cdot \frac{180^\circ}{\pi\ \cancel{\text{rad}}}$ $\quad$ 3. $\frac{\pi}{3}$ radians $\frac{}{1}\left(\frac{180}{\pi}\right)$

$\frac{\pi}{4}$ radians

$\approx 171.89^\circ$

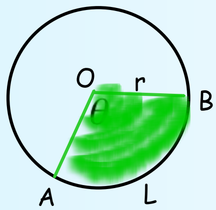
$\approx 171^\circ\ 53'\ 14.4''$

$\frac{\cancel{\pi}}{3} \cdot \frac{180^\circ}{\cancel{\pi}}$

60°

$$\boxed{\theta = \frac{L}{r}}$$

θ = Central Angle in **Radians**
L = arc length (same units as radius



Find arc length, L, of $\overset{\frown}{AB}$

$$L = \theta r$$

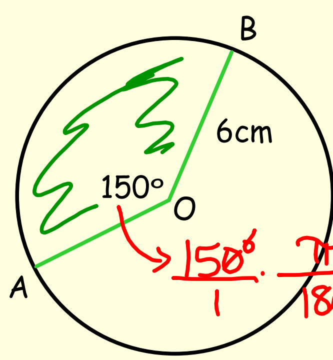
Find area of sector $\overset{\frown}{AOB}$

$$\frac{A_{sec}}{A_{circle}} = \frac{\text{Arc Length } (L)}{\text{Circumference}}$$

$$\cancel{\pi r^2} \cdot \frac{A_{sec}}{\cancel{\pi r^2}} = \frac{\theta \cancel{r}}{2\cancel{\pi}\cancel{r}} \cdot \cancel{\pi} r^2$$

$$\boxed{A_{sec} = \frac{1}{2}\theta r^2}$$

Convert 150° to radians. Then find



$$\frac{150^\circ}{1} \cdot \frac{\pi}{180^\circ}$$

$$\frac{5\pi}{6}$$

a. area of $\overset{\frown}{AOB}$ $= \frac{1}{2}\theta r^2$

$= \frac{1}{2} \cdot \frac{5\pi}{6} \cdot 6^2$

$= 15\pi \text{ cm}^2$

b. m $\overset{\frown}{AB}$

measure of arc AB = central angle

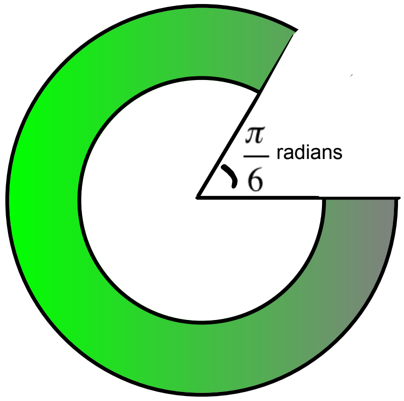
$= \frac{5\pi}{6}$

c. $\overset{\frown}{AB}$ = arc length

$L = \theta r \longrightarrow L = \frac{5\pi}{6} \cdot 6 \rightarrow L = 5\pi$

d. perimeter of $\overset{\frown}{AOB}$ $= 5\pi + 12$

Find the area and perimeter of the shaded part of the figure. The radius of the inner circle is 4cm and the outer circle is 9cm. Give answer exact, and to two d.p.



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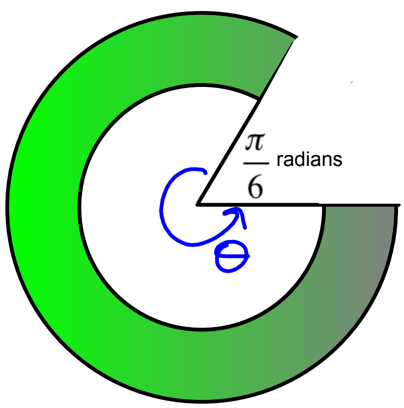
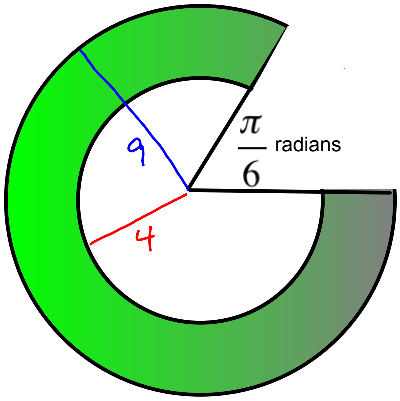


central angle:

$\theta = 2\pi - \frac{\pi}{6}$

$\theta = \frac{12\pi}{6} - \frac{\pi}{6}$

$\theta = \frac{11\pi}{6}$



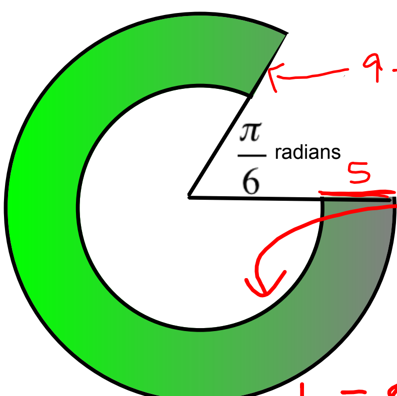
A= $A_{\text{sec with outer radius}} - A_{\text{sec with inner radius}}$

$$\frac{\theta r^2}{2} - \frac{\theta r^2}{2}$$

$$\frac{1}{2} \cdot \frac{11\pi}{6}(9)^2 - \frac{1}{2} \cdot \frac{11\pi}{6}(4)^2$$

$$\frac{}{12} - \frac{}{12}$$

$$\frac{715\pi}{12} \text{ cm}^2$$



$\leftarrow 9-4=5$

P= outer arclength + inner arclength + 10

$$\frac{33\pi}{2} + \frac{22\pi}{3} + 10$$

$$L = \frac{11\pi}{6}(4)$$

$$L = \theta r$$

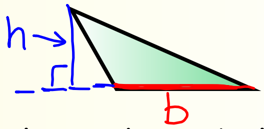
$$L = \frac{11\pi}{6}(9)$$

84.87

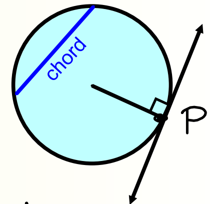
RECALL FROM GEOMETRY:

Volume of a cylinder = Bh where B is area of the base, and h is the height of cylinder

Area of a triangle = $\frac{1}{2}$bh



If a line is tangent to a circle as shown below, then the radius is perpendicular to the tangent line at the point of tangency, (P).



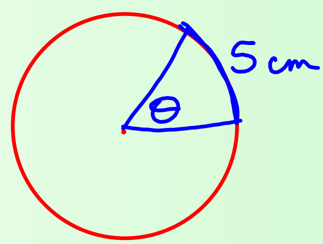
A chord of a circle is a segment that connects two points on the circle.

Subtend: 1. to mark or form the boundary of

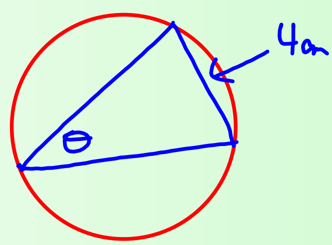
2. to be opposite to

Examples:

The angle subtended at the center of a circle by a 5 cm arc.



The angle subtended at the circumference of a circle by a 4 cm chord.

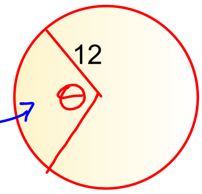


Tonight's HW: wording of problem 8 and 10

central ∢ θ

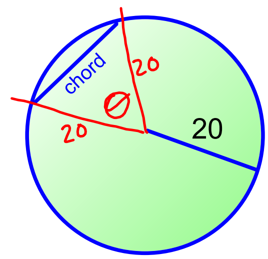
8. Find the angle subtended at the centre of a circle of radius length 12 cm by an arc which forms a sector of area 80 sq cm

$A_{sec} = 80\,cm^2$



10. A chord of length 32 cm is drawn in a circle of radius 20 cm. Find the angle it subtends at the centre.

central angle
θ



HW: SL book p. 312

#1(i, v, xi, xv), #2-10 even

HW Week 4: Wed.
PC p. 293
PC p. 295
SL p. 277 (2 days)